

NAME

Key

DATE

PERIOD

10-2

Skills Practice

Logarithms and Logarithmic Functions

Write each equation in logarithmic form.

1. $2^3 = 8$

$\log_2 8 = 3$

2. $3^2 = 9$

$\log_3 9 = 2$

3. $8^{-2} = \frac{1}{64}$

$\log_8 \frac{1}{64} = -2$

4. $\left(\frac{1}{3}\right)^2 = \frac{1}{9}$

$\log_{1/3} \frac{1}{9} = 2$

Write each equation in exponential form.

5. $\log_3 243 = 5$

$3^5 = 243$

6. $\log_4 64 = 3$

$4^3 = 64$

7. $\log_9 3 = \frac{1}{2}$

$9^{1/2} = 3$

8. $\log_5 \frac{1}{25} = -2$

$5^{-2} = \frac{1}{25}$

Evaluate each expression.

9. $\log_8 25$

2

10. $\log_9 8$

$= \frac{1}{2}$

11. $\log_{10} 1000$

3

12. $\log_{125} 5$

$= \frac{1}{3}$

13. $\log_4 \frac{1}{64} = -3$

14. $\log_5 \frac{1}{625}$

-4

15. $\log_8 8^3$

3

16. $\log_{27} \frac{1}{3}$

$-\frac{1}{3}$

Solve each equation or inequality. Check your solutions.

17. $\log_3 x = 5$

$3^5 = x$

$243 = x$

18. $\log_2 x = 3$

$2^3 = x$

$8 = x$

19. $\log_4 y < 0$

$4^0 > y$

$0 < y < 1$

20. $\log_4 x = 3$

$4^3 = x$

$64 = x$

21. $\log_2 n > -2$

$2^{-2} < n$

$n > \frac{1}{4}$

22. $\log_6 3 = \frac{1}{2}$

$(6^{1/2})^2 = 3$

$6 = 9$

23. $\log_8 (4x + 12) = 2$

$6^2 = 4x + 12$

$24 = 4x$

$x = 6$

24. $\log_2 (4x - 4) > 5$

$2^5 < 4x - 4$

$32 < 4x - 4$

$36 < 4x$

$9 < x$

25. $\log_8 (x + 2) = \log_8 (3x)$

$x + 2 = 3x$

$2 = 2x$

$x = 1$

26. $\log_8 (3y - 5) = \log_8 (2y + 3)$

$3y - 5 = 2y + 3$

$y = 8$

$3y - 5 > 0$

$2y + 3 > 0$

$y > 5/3$

$y > 5/3$

Minneco Algebra 2

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Odds

10-3

Skills Practice

Properties of Logarithms

Use $\log_2 3 \approx 1.5850$ and $\log_2 5 \approx 2.3219$ to approximate the value of each expression.

1. $\log_2 25$

$$\log_2 5^2$$

$$2(2.3219) = 4.6438$$

2. $\log_2 27$

3. $\log_2 \frac{8}{5}$

$$\log_2 8 - \log_2 5$$

$$3 - 2.3219 \approx 0.6781$$

4. $\log_2 \frac{5}{8}$

5. $\log_2 15$

$$\log_2 5 + \log_2 3$$

$$2.3219 + 1.5850 \approx 3.9069$$

6. $\log_2 45$

7. $\log_2 75$

$$\log_2 5^2 + \log_2 3$$

$$2(\log_2 5) + \log_2 3$$

$$4.6438 + 1.5850 \approx 6.2288$$

8. $\log_2 0.6$

9. $\log_2 \frac{1}{3}$

$$\log_2 1 - \log_2 3$$

$$0 - 1.5850 \approx -1.5850$$

10. $\log_2 \frac{9}{5}$

Solve each equation. Check your solutions.

11. $\log_{10} 27 = 3 \log_{10} x$

$$27 = x^3$$

$$3 = x$$

12. $3 \log_7 4 = 2 \log_7 b$

$$\log_4 5x = \log_4 60$$

$$5x = 60$$

13. $\log_4 5 + \log_4 x = \log_4 60$

$$x = 12$$

14. $\log_8 2a + \log_8 8 = \log_8 80$

15. $\log_5 y - \log_5 8 = \log_5 1$

$$y = 8$$

16. $\log_2 q - \log_2 3 = \log_2 7$

$$\log_9 4.25 = \log_9 w$$

$$100 \div w$$

17. $\log_9 4 + 2 \log_9 5 = \log_9 w$

18. $3 \log_8 2 - \log_8 4 = \log_8 b$

$$3x^2 - 5x - 2 = 0$$

$$3x^2 - 6x + x - 2 = 0$$

$$3x(x-2) + 1(x-2) = 0$$

$$(3x+1)(x-2) = 0$$

$$x = -\frac{1}{3} \quad x = 2$$

19. $\log_{10} x + \log_{10} (3x-5) = \log_{10} 2$

$$\log_{10} x(3x-5) = \log_{10} 2$$

$$3x^2 - 5x = 2$$

21. $\log_3 d + \log_3 8 = 3$

$$3^3 = 3d$$

$$27 = 3d$$

$$9 = d$$

23. $\log_2 s + 2 \log_2 5 = 0$

$$\log_2 25s = 0$$

$$2^0 = 25s$$

$$1 = 25s$$

25. $\log_4 (n+1) - \log_4 (n-2) = 1$

$$\log_4 \frac{n+1}{n-2} = 1 \rightarrow 4^1 = \frac{n+1}{n-2}$$

20. $\log_4 x + \log_4 (2x-3) = \log_4 2$

22. $\log_{10} y - \log_{10} (2-y) = 0$

24. $\log_2 (x+4) - \log_2 (x-3) = 3$

26. $\log_5 10 + \log_5 12 = 3 \log_5 2 + \log_5 a$

$$3n = 9$$

$$n = 3$$